

The arrangement of holes 231 through 234 and engaging surfaces 221 through 225 also enables the insertion of tissue pad 208, that may be manufactured straight, into a curved clamp arm 202. Beveled front end 209 of tissue pad 208
5 (see Figure 28) facilitates insertion of tissue pad 208 T-shaped protrusion 212 into clamp arm 202 straight T-slot 226 and through curved portion 236.

Referring to Figures 30 and 31, tissue pad 208 T-shaped protrusion 212 is insertable into clamp arm 202 straight T-slot 226. Clamp arm 202 is designed
10 such that tissue pad 208 may be manufactured as a straight component by, for example, injection molding, machining, or extrusion. As clamp arm 202 is inserted into straight T-slot 226 and moved progressively through curved portion 236, beveled front edge 209 facilitates bending of tissue pad 208 to conform to the curvature of clamp arm 202. The arrangement of holes 231 through 234 and
15 engaging surfaces 211 through 225 enables clamp arm 202 to bend and hold tissue pad 208.

Figures 32 and 33 illustrate how clamp arm 202 holds tissue pad 208 in place while maintaining a bend in tissue pad 208 that conforms to curved portion
20 236 of clamp arm 202. As illustrated in Figure 32, third engaging surface 223 contacts right protrusion surface 216 providing a contact edge 238, while left protrusion surface 214 is unsupported at this position. At a distal location, illustrated in Figure 33, fourth engaging surface 224 contacts left protrusion surface 214 providing a contact edge 239, while right protrusion surface 216 is
25 unsupported at this location.

Referring back now to Figure 2 again, the inner tube 170 of the elongated member 150 fits snugly within the opening 166 of the outer tube 160. The inner tube 170 preferably includes an inner hub 172, a tubular member 174, a
30 circumferential groove 176, a pair of opposing openings 178, a pair of opposing openings 178, and a longitudinal opening or aperture 175 extending therethrough. The inner tube 170 preferably has a substantially circular cross-section, and may

be fabricated from stainless steel. It will be recognized that the inner tube 170 may be constructed from any suitable material and may be any suitable shape.

The inner hub 172 of the inner tube 170 preferably has a larger diameter than the tubular member 174 does. The pair of opposing openings 178 of the inner hub 172 allow the inner hub 172 to receive the pin 163 to allow the inner tube 170 and the ultrasonic waveguide 179 to transfer torque for attaching ultrasonic waveguide 179 to stud 50 as previously described. An O-ring 220 is preferably disposed in the circumferential groove 176 of the inner hub 172.

The ultrasonic waveguide 179 of the elongated member 150 extends through aperture 175 of the inner tube 170. The ultrasonic waveguide 179 is preferably substantially semi-flexible. It will be recognized that the ultrasonic waveguide 179 may be substantially rigid or may be a flexible wire.

The ultrasonic waveguide 179 may, for example, have a length substantially equal to an integral number of one-half system wavelengths ($n\lambda/2$). The ultrasonic waveguide 179 may be preferably fabricated from a solid core shaft constructed out of material which propagates ultrasonic energy efficiently, such as titanium alloy (i.e., Ti-6Al-4V) or an aluminum alloy. It is contemplated that the ultrasonic waveguide 179 may be fabricated from any other suitable material. The ultrasonic waveguide 179 may also amplify the mechanical vibrations transmitted to the ultrasonic blade 88 as is well known in the art.

As illustrated in Figure 2, the ultrasonic waveguide 179 may include one or more stabilizing silicone rings or damping sheaths 110 (one being shown) positioned at various locations around the periphery of the ultrasonic waveguide 179. The damping sheaths 110 dampen undesirable vibration and isolate the ultrasonic energy from the inner tube 170 assuring the flow of ultrasonic energy in a longitudinal direction to the distal end of the ultrasonic blade 88 with maximum efficiency. The damping sheaths 110 may be secured to the ultrasonic waveguide

179 by an interference fit such as, for example, a damping sheath described in U.S. Patent Application No. 08/808,652 hereby incorporated herein by reference.

Referring again to Figure 2, the ultrasonic waveguide 179 generally has a first section 182, a second section 184, and a third section 186. The first section 182 of the ultrasonic waveguide 179 extends distally from the proximal end of the ultrasonic waveguide 179. The first section 182 has a substantially continuous cross-section dimension.

The first section 182 preferably has at least one radial waveguide hole 188 extending therethrough. The waveguide hole 188 extends substantially perpendicular to the axis of the ultrasonic waveguide 179. The waveguide hole 188 is preferably positioned at a node but may be positioned at any other suitable point along the ultrasonic waveguide 179. It will be recognized that the waveguide hole 188 may have any suitable depth and may be any suitable shape.

The waveguide hole 188 of the first section 182 is aligned with the opposing openings 178 of the hub 172 and outer tube holes 161 of hub 162 to receive the pin 163. The pin 163 allows rotational torque to be applied to the ultrasonic waveguide 179 from the rotational knob 190 in order to rotate the elongated member 150. Passageway 195 of elongated member 150 includes opposing openings 178, outer tube holes 161, waveguide hole 188, and opposing holes 199.

The second section 184 of the ultrasonic waveguide 179 extends distally from the first section 182. The second section 184 has a substantially continuous cross-section dimension. The diameter of the second section 184 is smaller than the diameter of the first section 182. As ultrasonic energy passes from the first section 182 of the ultrasonic waveguide 179 into the second section 184, the narrowing of the second section 184 will result in an increased amplitude of the ultrasonic energy passing therethrough.